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THE

Journal of the Society of Arts,

AND OF

THE INSTITUTIONS IN UNION.

110th Session.] FRIDAY, MARCH 25, 1864. [No. 592. Vol. XII.

Announcements by the Council.

Ordinary Meetings.

Wednesday Evenings, at 8 o'clock.

March 30.—"Artificial Light and Materials Used for Lighting." By B. H. Paul, Esq.

April 6.—"On the Principles of Imitation as Applied to the Decorative Arts." By Thomas Purdie, Esq.

Cantor Lectures.

Six lectures on "Chemistry applied to the Arts" will be delivered by Dr. F. Crace Calvert, F.R.S., F.C.S., corresponding member of the Royal Academy of Turin, of the Société Industrielle de Mulhouse, of the Société Imperiale de Pharmacie de Paris, &c., on Thursday evenings, at 8 o'clock, as follows:—

March 31.—Lecture I.—Bones.—Composition of raw and boiled bones. The manufacture of superphosphate of lime. Application to agriculture. Bone-black or char, and their use in sugar refining. *Phosphorus*, its properties, extraction and employment in manufacture of matches. *Horn* and *ivory*, their composition and applications.

April 7.—Lecture II.—Gelatine, Glue, Bone-size Chondrine, their preparation, chemical properties, nutritive value, and application to arts and manufactures. Artificial tortoiseshell. *Isinglass*, its adulterations and adaptations to clarification of fluids. *Skins* and the art of tanning.

April 14.—Lecture III.—Leather.—The art of the currier. Morocco, Russia, and patent leathers. The art of tawing skins. Chamois and glove skins. Parchment. *Hair*, its composition and dyeing. *Wool*, its washing, scouring, bleaching, and dyeing. *Silk*, its adulterations and conditioning.

April 21.—Lecture IV.—Animal Fatty Matters, the various processes for liberating them from the tissues in which they are contained. Their composition and conversion into soap. Composite candles. The refining of lard. *Cod-liver*, *sperm*, and other oils. *Spermaceti* and *wax*.

April 28.—Lecture V.—Flesh, its chief constituents, boiling, roasting, and preservation. *Animal black*, its manufacture and applications. The employment of animal refuse in the manufacture of *prussiate of potash*. *Prussian blue*. Manufacture of artificial animal manures.

May 5.—Lecture VI.—Animal Liquids.—*Bile*, its purification and detergent properties. *Blood*, its application in the refining of sugar and the manufacture of albumen. *Albumen*, its use in calico printing and photography. *Urine*, its uses. *Milk*, its composition properties, falsification, and preservation. A few words on putrefaction.

Proceedings of the Society.

CANTOR LECTURES.

Fine Arts Applied to Industry. By W. Burges, Esq.

Seventh Lecture, Monday, March 21.—The Weaver's Art.

On Monday night, Mr. Burges, in delivering the concluding lecture of his series, began by stating how different costumes required different treatment in the designs of the fabrics which composed them, and after giving a short account of the principal features of the costume in the middle ages he showed how, in spite of the perishable nature of all fabrics, we had sufficient materials for the history and for the illustration of those of the middle ages, thanks to the mass of documentary evidence and to the custom of burying distinguished persons in their official robes, and of wrapping up reliques in precious stuffs. It appeared that in the first instance the production was monopolised by Byzantine and the Eastern nations; it then extended to Sicily and Venice, to Italy and the rest of Europe, thus accounting for the prevalence of entire inscriptions on earlier specimens, and for the imitation of them much later. The gradual increase of the diaper or pattern was another curious peculiarity, the stuff composing the robe of the Emperor Henry VI., preserved in the duomo at Palermo, exactly resembling the Indian kincob. Allusion was made to the very excellent series of specimens of ancient stuffs at South Kensington, where the increase of the patterns was distinctly shown from the somewhat large diapers of the 14th century down to the great pine patterns of the latter end of the 15th century, resplendent with gold thread and crimson velvet. The lecturer next touched upon the Indian productions, of which some choice specimens had been lent by Dr. Forbes Watson, from the Indian museum. Attention was particularly directed to the beautiful kincobs, the Delhi embroidery, and the exquisite combinations of colour in the Cashmere shawls, as well as to the excellent work about to be produced by Dr. Watson at the government expense, which would contain specimens of a great quantity of Indian fabrics, each copy consisting of no less than 20 volumes. The Persian and Turkish carpets formed the next part of the subject, and were commended for their colours as well as for the excellence of the materials; and a reproduction of a mediæval carpet by Mr. Fisher, from a pattern of Van Eyk's, was favourably noticed as giving us a great addition to the floor coverings of our apartments. With regard to our modern productions, regret was expressed that from the nature of our present costume there should be no better scope for the colours in the fabrics made for our dresses, but at the same time it was remarked that there were stuffs devoted to other uses, which offered an almost unlimited field, such as damasks, chintzes, brocades, stuff for the table, as napkins; and for the beds, as counterpanes; coverings for chairs and other furniture, to say nothing of carpets and rugs. Mr. Crace was fortunate enough to secure the services of the late

Mr. W. Pugin, and some of the fabrics made from his designs, more especially what was called the tapestry, left very little to be desired; the only fault that could be noticed being the animal on the chintzes, which had been conventionalised after the fashion of the 15th century, instead of that of a purer period of art. The lecturer concluded his task with a few remarks concerning our future progress in art. According to him the development will probably arise from our domestic architecture, political circumstances rendering it doubtful whether either public or ecclesiastical architecture will again exercise so much influence as they have done in other periods of the world's history. The great helps to improvement were then enumerated. 1. The better education of the designer by a more extended teaching of the figure. 2. Of the public at large, by bringing art collections, if not to their doors, at all events within their daily walks. 3. A wiser system of expenditure with regard to our public monuments. 4. A greater encouragement of the fine arts of painting and sculpture in our ecclesiastical buildings; and 5. the abolition of the law of leasehold. The walls of the room were covered with a large collection of modern fabrics, lent by Mr. Crace, with sundry pieces of embroidery and carpets by Messrs. Harland and Fisher; and finally, some exquisite specimens of Kincob-Indian embroidery and Cashmere shawls, most kindly lent from the Indian Museum by the courtesy of its curator, Dr. Forbes Watson.

The Chairman (Mr. Hawes), after noticing the very crowded attendance at Mr. Burges's lectures, and inferring, therefore, that the members of the Society approved the mode in which the Council had appropriated the proceeds derived from Dr. Cantor's legacy, said that this being the concluding lecture of Mr. Burges's course, he would ask the audience to thank the lecturer for the careful manner in which he had brought before them so interesting and important a subject as "Art applied to Industry," though with some of the views expressed as to the inferiority of modern as compared with ancient art industry, he (the Chairman) could not himself agree. He particularly wished, on behalf of the Council, to thank the gentlemen who, by the loan of many very valuable illustrations for each lecture, had contributed so much to increase the interest of the course.

Proceedings of Institutions.

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* The Boards marked thus have been formed this year.

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INSTITUTION OF NAVAL ARCHITECTS.

The annual meeting was held at the House of the Society of Arts, commencing on the 17th inst. The proceedings opened by the annual report of the Council being read by the Secretary.

Sir John Pakington, the President, then addressed the meeting. After some congratulatory remarks on the satisfactory character of the report and progress of the institution, the right hon. baronet paid a deserved compliment to the foresight of the gentlemen who chiefly assisted in the foundation of the Society at a time when the introduction of a new class of ships was changing the science of naval architecture to its very foundations. The president then adverted to the important paper read last year by Mr. Scott Russell, on the re-establishment of a School of Naval Architecture, especially contrasting the advantage possessed by Frenchmen over the English student of this subject, so important to a maritime country. Sir John went on to describe the communications which had passed on the subject between himself and the Lords of the Admiralty, and spoke wtth great satisfaction of the comparative certainty which now existed of the establishment of a School of Naval Architecture, in which the constructors of the Royal Navy and mercantile marine should be fairly represented, both in the direction of the institution, and in the benefits to be derived from it, while the general presidency of the school would remain, as it ought, with that department of the State which (as the chief shipbuilder of this maritime country) all must acknowledge as the most fit and proper to take the control and to exercise power and superintendence in an institution of this kind. The president had been requested to put a question to the government in the House of Commons on the subject, but after he had given notice of it, he received a most satisfactory letter from the Committee of Council on Education which rendered it unnecessary to put the question. In compliance with the request contained in it, the Council had re-appointed the gentlemen who formed the committee on this subject last year, to enter into communication with Dr. Woolley and Captain Donnelly. The next question alluded to was that of the building of iron-clad vessels of war. The right hon. gentleman took the opportunity of emphatically contradicting certain statements which had been imputed to him, to the effect that he had boasted of the *Warrior* on the express ground that that ship was imperfectly and partially plated. He thought no one would give him credit for being so absurd as to suppose that ships completely plated were not preferable to vessels imperfectly protected. But he pointed out that at the time the *Warrior* was laid down there was no certainty that a seaworthy vessel could be constructed with complete plating from stem to stern, and in so novel, anxious, and costly an experiment, the designers had not ventured to risk the success of the trial by loading her stem and stern with heavy armour. But while there was no certainty that this could be done, the right hon. baronet had never ventured to prophecy that no completely plated ships could ever be constructed. His impression still was, however, that this is a very doubtful problem, and he was disposed, even at this moment, to think it likely that the ultimate solution of the problem would be that ships might be plated throughout, but that the plating of the stem and stern would probably be of a lighter character than that of the central parts of the ship. Sir John Pakington then gave a most emphatic disclaimer of having ever spoken with any intentional slight of his friend Mr. Reed. If there were any slight whatever to that gentleman, it was due to the accidental circumstance that Sir John did not allude to him at all. The right hon. baronet added a compliment to the present Board of Admiralty on the courage which they had shown in not shrinking from experiment on account of the risk of failure. The President then called attention to some resolutions of the Council passed with a view to regulate the business of the meeting in such a manner as to enable the great number of papers communicated to it to be satisfactorily read and discussed in the limited time at its disposal, and ended by moving the re-appointment of the officers of the institution.

The motion was put and carried unanimously.

Then followed the reading and discussion of the papers. Abstracts of some of these will appear in a future number of the *Journal*. At present the abstract of one of them only is given, the subject having occupied so prominent a place in the President's address, and being one of special interest, owing to the proposal on the part of the Government to establish a School of Naval Architecture.

On the Education of Naval Architects. By the Rev. Joseph Woolley, LL.D., Vice-President.

After giving a brief account of the early history of the first application of scientific education in this country to the art of naval construction, from the time of "Master Phineas Pett," in the beginning of the 17th century, and calling attention to the marked superiority of vessels of French build over those of English construction, due to the superior care taken by the French Government to employ the highest scientific skill in the construction of these great works of art—quoting the statements of Mr. Creaze, in the "Encyclopædia Britannica," that this superiority was so well recognised that vessels captured from the French passed at once into the English navy, while those of English build captured by the French were thought too bad for theirs. Dr. Woolley spoke strongly of the ill effects which had resulted from the instinctive feeling so long prevalent in this country against the application of theoretical knowledge to practical construction. He then proceeded to give a brief account of the two Schools of Naval Architecture, one of which had been established in 1811, and abolished in 1832, and the other established in 1848, and broken up in 1853. Discouraged and eventually destroyed by the dislike and suspicion of the uneducated members of the profession, these establishments had turned out scholars whose thorough professional training and theoretical knowledge had enabled them, in spite of every drawback, to take leading positions both in the yards of private builders and even in the public service, among those very men whose jealousy had brought about the discontinuance of the system which had produced them. It was on the scholars from the earlier of these schools that the Admiralty had to depend in the re-construction of the navy, consequent on the introduction of steam; and pupils of the later establishment were now among the foremost in the building of those iron-clad vessels which now seemed our most reliable defence at sea. Dr. Woolley mentioned that in the school of naval construction of 1848-53, of which he was the head, he attempted to open the whole range of mathematical and theoretical studies, so far as they could in any degree have a bearing on the problems to be solved by the naval architect, and the school was, to all intents and purposes, a school of naval architecture. The study of the practical parts of a shipbuilder's work was, of course, placed in other hands. Of this he would only say that the opportunities obtainable in Portsmouth dockyard were such as should have turned out accomplished practical shipwrights—but Portsmouth and all other dockyard towns were and still are wanting in one great requisite—efficient *practical* instruction in physics, chemistry, metallurgy, and the like, which require an ample supply of expensive material for their illustration. Dr. Woolley then reverted to the absolute necessity of using the highest scientific skill in the construction of our ships. "No doubt," he said, "other things being equal, the courage and pluck of the British seaman may be relied upon to ensure success, but since the application of steam power to the propulsion of ships, and the mechanical inventions of all kinds which have been introduced, it is not, I think, too much to assert that the country which in future naval wars shall possess ships on the best models, with the best sea-going qualities, the most securely defended against attack, and the most powerful in the means of offence, will possess advantages which no amount of skill and courage will be able to countervail." Dr. Woolley then proceeded to describe the kind of instruction which the modern students of naval architecture needed to receive :—A thorough grasp of all those mathematical and physical studies (many of them of a very high order) which enter into the principles of the construction and behaviour of vessels—not a superficial acquaintance with rules and formlæ, and a trick of applying for their own purpose the result of other men's work, but a thorough comprehension and command of their subject, so that they might be able to think independently upon it, and make this thought take a practical form in their designs. On the other hand, it was no less indispensable that they should have a thoroughly practical training in the actual work of a dockyard, so as not only to gain a complete knowledge of the nature and use of the tools employed, but also that they should learn how work should be begun and carried on, so that they might both direct others how to set about it properly, and might know what may and what may not be expected from those employed under their superintendence. They must also be skilful draughtsmen and expert calculators. Dr. Woolley pointed out that by the plan proposed, of pursuing the theoretical studies during the winter in London, and then giving the scholars some months of unbroken practical work in the dockyard in the summer, when the hours of daylight and of work were longest, and the season of the year most fitted for out-door labour, they would have really better opportunities of learning practical shipbilding, and would be more useful in the yards than by the daily alternation of labour and study followed in the former School of Naval Construction. For all the theoretical part of this instruction Dr. Woolley remarked that there was no place in this country where it could be obtained so readily and so cheaply as in London. In no other town were there such facilities for attending lectures on physics, frequently needing expensive materials for their illustration—nowhere else was it possible, at any reasonable cost, to secure the services of the ablest men of the day as lecturers and teachers. In Dr. Woolley's opinion these considerations were conclusive in favour of a metropolitan school, to say nothing of the accidental advantage of breaking the monotony of a dockyard life—bringing the student into an atmosphere charged with science, where he would be surrounded on all sides by objects which appealed to his sense of the beautiful, where he might spend his leisure moments among the models of former patented inventions, and make himself acquainted readily and in the most effective manner with their several contrivances and uses, where he might almost unconsciously imbibe the best practical lessons in machinery, and the adaptation of simple mechanical means to desired ends.

SOUTH LONDON WORKING CLASSES INDUSTRIAL EXHIBITION.

The distribution of prizes to the successful competitors at this exhibition took place on Thursday evening the 17th of March. The chair was taken by Mr. Samuel Morley, who opened the proceedings by calling on Mr. Murphy, the secretary, to read the report. From this it appears that the exhibition has been most successful, both as to the number of exhibitors and the attendance. During the nine days it was open it was visited by no less than 30,000 persons, and the money taken at the doors is said to have been more than sufficient to cover the expenses. The entrance fees and the sale of a few small articles have realised the sum of £288.

The **Chairman** congratulated the exhibitors on the success the scheme had met with. He felt assured from what he had seen that there was a large amount of latent intelligence and genius among the masses of the population, which only wanted bringing out by means like the present. The temperance movement had a great deal to do with the success of this exhibition, for the time which the men had hitherto spent in publichouses was now devoted to the designing and manufacture of the useful and artistic objects with which they were surrounded. Numerous well-meant attempts had been made to force on the working classes schemes with which they could have no sympathy, but the numerous articles exhibited, and the large number of visitors plainly showed that this was a matter into which the working men threw themselves heart and soul. He concluded by urging the exhibitors to exert their influence on their friends, to induce them to join in similar occupations.

Mr. **Washington Wilks**, in referring to the very gratifying experiment that had been made, said that the self-elevation of working people was promoted by the useful or thoughtful employment of their spare time. Habitual work did not require much thought, and it was only when a man employed himself at some occupation to which he was totally unaccustomed that his mind became expanded. The articles exhibited were not all first-rate, but they had not been made with the idea of being exhibited or rewarded. Now that the idea was fairly started he expected that when the men knew that the articles they made would be submitted to the scrutinizing gaze of the public, and to the competition of their fellow labourers, they would take infinitely more pains in perfecting them.

The Chairman proceeded to distribute the prizes, which consisted of chromo-lithographs, framed and glazed, inscribed with the name of the exhibitor, and giving a short description of the articles for which the award had been given. They were divided into four classes of merit—first-class, second-class, highly commended, and commended. When the whole had been distributed the chairman said he had the satisfaction of informing them that their good example had already been followed, for the working men of the east end of London had commenced a similar industrial exhibition. The proceedings concluded by the presentation of an address from the exhibitors to Mr. Murphy, the secretary. It was written by James Durrant, a tinplate-worker. During the evening a large chamber organ, the work of Charles Meachim, a journeyman carpenter, performed a number of popular airs.

RESULTS OF POSTAL REFORM.

As Sir Rowland Hill has just retired from his duties as Secretary of the Post Office, it would appear to be a fitting time to call attention to the results of those reforms which he was so active in introducing, and the more important organic improvements which he effected, as follows :—

A very large reduction in the rates of postage on all correspondence, whether inland, foreign, or colonial. As instances in point, it may be stated that letters are now conveyed from any part of the United Kingdom to any other part—even from the Channel Islands to the Shetland Isles— at one-fourth of the charge previously levied on letters passing between post towns only a few miles apart;[*] and that the rate formerly charged for this slight distance—viz., fourpence—now suffices to carry a letter from any part of the United Kingdom to any part of France, Algeria included.

The adoption of charge by weight, which, by abolishing the charge for mere enclosures, in effect largely extended the reduction of rates.

Arrangements which have led to the almost universal resort to prepayment of correspondence, and that by means of stamps.

The simplification of the mechanism and accounts of the department generally, by the above and other means.

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[*] When Sir Rowland Hill's plan was published the lowest general post rate was fourpence, but while the plan was under the consideration of Government the rate between post towns not more than eight miles asunder was reduced from fourpence to twopence.

The establishment of the book-post (including in its operation all printed and much MS. matter), at very low rates, and its modified extension to our colonies, and to many foreign countries.

Increased security in the transmission of valuable letters afforded, and temptation to the letter-carriers and others greatly diminished, by reducing the registration fee from 1s. to 4d., by making registration of letters containing coin compulsory, and by other means.

A reduction to about one-third in the cost—including postage—of money orders; combined with a great extension and improvement of the system.

More frequent and more rapid communication between the metropolis and the larger provincial towns; as also between one provincial town and another.

A vast extension of the rural distribution—many thousands of places, and probably some millions of inhabitants, having, for the first time, been included within the postal system.

A great extension of free deliveries. Before the adoption of penny postage many considerable towns, and portions of nearly all the larger towns, had either no delivery at all, or deliveries on condition of an extra charge.

Greatly increased facilities afforded for the transmission of foreign and colonial correspondence; by improved treaties with foreign countries, by a better arrangement of the packet service, by sorting on board, and other means.

A more prompt despatch of letters when posted, and a more prompt delivery on arrival.

The division of London and its suburbs into ten postal districts—by which, and other measures, communication within the twelve miles circle has been greatly facilitated, and the most important delivery of the day has, generally speaking, been accelerated as much as two hours.

Concurrently with these improvements, the condition of the employés has been materially improved; their labours, especially on Sunday, having been very generally reduced, their salaries increased, their chances of promotion augmented, and other important advantage afforded them.

Sir Rowland Hill's pamphlet on "Post-Office Reform" was written in the year 1836. During the preceding twenty years—viz., from 1815 to 1835, inclusive—there was no increase whatever in the Post Office revenue, whether gross or net; and, therefore, in all probability, none in the number of letters: and though there was a slight increase in the revenue, and doubtless in the number of letters, between 1835 and the establishment of penny postage, early in 1840—an increase chiefly due to the adoption of part of Sir R. Hill's plan, viz., the establishment of day mails to and from London—yet, during the whole period of twenty-four years immediately preceding the adoption of penny postage, the revenue, whether gross or net, and the number of letters, were, in effect, stationary.

Contrast with this the rate of increase under the new system which has been in operation during a period of about equal length. In the first year of penny postage the letters more than doubled; and though since then the increase has, of course, been less rapid, yet it has been so steady that, notwithstanding the vicissitudes of trade, every year, without exception, has shown a considerable advance on the preceding year, and the first year's number is now nearly quadrupled. As regards revenue, there was, of course, a large falling off—about a million in gross, and still more in net revenue. Since then, however, the revenue, whether gross or net, has rapidly advanced, till now it even exceeds its former amount; the rate of increase, both of letters and revenue, still remaining undiminished.

In short, a comparison of the year 1863 with 1838 (the last complete year under the old system) shows that the number of chargeable letters has risen from 76 millions to 642 millions; and that the revenue, at first so much impaired, has not only recovered its original amount, but risen, the gross from £2,346,000 to about £3,870,000, and the net from £1,660,000 to about £1,790,000.[*]

The expectations held out by Sir R. Hill before the change were, that eventually, under the operation of his plans, the number of letters would increase fivefold, the gross revenue would be the same as before, while the net revenue would sustain a loss of about £300,000. The preceding statement shows that the letters have increased, not fivefold, but nearly eight and a half fold; that the gross revenue, instead of remaining the same, has increased by about £1,500,000; while the net revenue, instead of falling £300,000, has risen more than £100,000.

While the revenue of the Post Office has thus more than recovered its former amount, the indirect benefit to the general revenue of the country arising from the greatly increased facilities afforded to commercial transactions, though incapable of exact estimate, must be very large. Perhaps it is not too much to assume that, all things considered, the vast benefit of cheap, rapid, and extended postal communication has been obtained, even as regards the past, without fiscal loss. For the future there must be a large ever-increasing gain.

The indirect benefit referred to above is partly manifested in the development of the Money Order system; under which, since the year 1839, the annual amount transmitted has risen from £313,000 to £16,494,000; that is, 52 fold.

An important collateral benefit of the new system is to be found in the cessation of that contraband conveyance which once prevailed so much that habitual breach of the postal law had become a thing of course.

It may be added that the organisation thus so greatly improved and extended for postal purposes stands available for other objects; and passing over minor matters, has already been applied with great advantage to the new system of Savings Banks.

Lastly, the improvements briefly referred to above, with all their commercial, educational, and social benefits, have now been adopted, in greater or less degree—and that through the mere force of example—by the whole civilized world.

Manufactures.

Steam Boiler Explosions.—The chief engineer's report to the Manchester Association, for the months of January and February, says that the ordinary visits of inspection have been made, 2 boilers tested by hydraulic pressure, and 307 defects discovered in the boilers examined, 10 of which were dangerous. A blister, measuring 24 inches by 12 inches, and three-sixteenths of an inch in thickness, was met with inside an internally-fired boiler, 8 feet in diameter, and working at a pressure of 45lbs. on the square inch. In two boilers, though only eighteen months old, the plates, which had been seven-sixteenths of an inch thick originally, were found to be eaten half through, while the rivet heads also were attacked. The feed water used was drawn from a well. In another boiler, which was of Lancashire construction, and fed from the Rochdale canal, the furnace crowns presented a spongy appearance, and channelling had set in at the transverse seams, which is unusual in internal flue tubes; also the rivet heads and angle irons were attacked. Internal corrosion had been successfully arrested, in many cases, by the use of carbonate of soda, introduced in small and frequent quantities with the feed water. Two waggon boilers were found to be so corroded along the brickwork seating that holes could be scraped through the plates. Two Lancashire boilers, set upon side walls, were found to be seriously corroded at the seating, in consequence of water, arising from the discharge of the safety-valves, &c., being allowed to fall upon them. Two other instances occurred to Lancashire boilers, in consequence of their being set upon mid-feather walls. Four cases of external corrosion occurred at the bottom of the shells of internally-fired tubular boilers, on account of the unequal expansion of the metal, consequent on the imperfect circulation of the water. The constant straining induced by this unequal expansion had produced leakage at the transverse seams, and thus corroded the plates. In such cases caulking is of little use. The only radical cure is to maintain the whole of the shell at an equal temperature, and this, in many cases, has been found to be sufficiently accomplished by carrying a return flue under the bottom of the boiler. Two other cases arose from leakage at the tube ends of multitubular boilers, from which the plates at the bottom of the combustion chambers were nearly eaten through. Some instances of pressure gauges out of order, and giving wrong indications, were met with. From the commencement of the present year up to February 19th, six explosions had occurred, from which twenty-five lives had been lost, and many persons injured. Not one of the boilers in question was under the charge of the Association. In one instance the feed pipe was found, upon examination, to have become choked with ice. This cut off the supply to the boiler, and it consequently exploded from shortness of water. In another case the boiler was 6 years old, the length being 31ft. 8in., its diameter 7ft., and the original thickness of the plates from three-eighths to seven-sixteenths of an inch, but considerable corrosion was proved to have taken place. In a third instance the water in the pipes had frozen, and thus the outlets became choked, and the steam pressure bottled up, so that on the fire being maintained for a sufficient time explosion became inevitable from accumulated pressure. Every boiler employed for heating and ventilating public buildings, as well as those for household purposes, should be fitted with an efficient mechanical safety valve, which would remain unaffected by changes of temperature. The importance of this with regard to domestic boilers is too apt to be overlooked.

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[*] In this comparison of revenue, the mode of calculation in use before the adoption of penny postage has of course been retained—that is to say, the cost of the packets on the one hand, and the produce of the impressed newspaper stamps on the other, have been excluded. The amounts for 1863 are, to some extent, estimated, the accounts not having as yet been fully made up.

Commerce.

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Pattern Post to Malta, Gibraltar, Alexandria, Cairo, Suez, and Constantinople.—On the 1st April next, and thenceforward, patterns of merchandise, similar to those already transmissible by post between any places in the United Kingdom, at reduced rates, may be transmitted by post between England and Malta, Gibraltar, Alexandria, Cairo, and Suez, by packet, *viâ* Southampton, at the following rates of postage, which must in all cases be pre-paid by postage stamps, viz.:—Not exceeding 4 ozs., 3d.; above 4 ozs. and not exceeding ½ lb., 6d.; above ½ lb. and not exceeding 1 lb., 1s.; above 1 lb. and not exceeding 1½ lb., 1s. 6d.; above 1½ lb. and not exceeding 2 lbs., 2s.; every additional ½ lb., 6d. Similar arrangements have been made between England and Constantinople, *viâ* France, the rates of postage being as follows:—Not exceeding 4 ozs., 4d.; above 4 ozs. and not exceeding ½ lb., 8d.; above ½ lb. and not exceeding 1 lb., 1s. 4d.; above 1 lb. and not exceeding 1½ lb, 2s.; above 1½ lb. and not exceeding 2 lbs., 2s. 8d.; for every additional ½ lb., 8d.

Canals in America.—A New York paper states that the estimated cost of the ship canal around Niagara Falls is five millions and a-half dollars. It is proposed to build it with locks 300 feet long, 50 feet wide, and 10 feet deep. In addition to this, three millions and a-half dollars will be asked for the Oswego and Erie canals, and four millions for a canal from the St. Lawrence over to Albany, *viâ* Lake Champlain, and thirteen million dollars for an enlargement of the Illinois canal from Keokuk to Chicago, so that vessels of 600 tons burthen can pass.

Cotton Cultivation in Italy.—A letter from Turin, in a Marseilles paper, says that the exhibition of Italian cotton, recently opened at the museum of that city, deserves to be pointed out to all friends of economic progress in Italy. Notwithstanding the short time which the minister of agriculture and commerce and the commissioners appointed by it had to organise this exhibition, the results obtained show in the most convincing manner that this valuable production needs not henceforward to be wanting in Italy. The number of exhibitors amounts to 208, divided over 38 provinces, and representing 113 communes extending from Como, and Brescia, as far as the most distant ones in Sicily. Each lot of cotton is accompanied by an explanatory note showing the name and address of the exhibitor, the name of the commune and of the province, the nature of the soil, the mode of cultivation, and the agricultural implements made use of.

Petroleum.—The report of the Commissioners appointed by the Navy Department of New York, consisting of three chief engineers, who have made careful experiments for five months, as to the practicability of using petroleum or hydrocarbon oils for the purpose of generating steam, has been issued, and proves satisfactory. It is alleged that its use will be a great saving, not only for merchant steamers, but that a naval steamer using it can keep the sea under steam three times as long with less labour and greater economy as compared with an eqnal weight of coal.

Folding Boat.—A partial trial was recently made at Portsmouth dockyard of a folding boat, intended by the inventor for use with troop or emigrant ships. The boat is flat-bottomed, with pointed ends, and will carry fifty people at a very light draught of water. In receiving passengers from any ship under circumstances of abandonment at sea, it would be required to be heavily weighted in addition to its human freight, in order to make it safe. Its principal merits appear to be the very small space a number of boats would occupy when folded up, and stowed away on board ship, and the large amount of boat accomodation which would thus be available in the event of disaster.

Silk.—The exports from China are falling off; from the great seat of export, Shanghai, only 39,245 bales were shipped last year against 84,983 bales in 1862.

Paper.—The supplies of foreign paper are largely on the increase since the abolition of the duty—133,401 cwt., valued at £288,761, were received last year, against 61,106 cwt. of the value of £96,550 in 1861. France last year supplied us paper of the value of £49,609, and Belgium 159,000. The import of rags for paper-making last year was 45,448 tons, or nearly double the amount of the previous year's imports, besides the enormous quantities of Esparto fibre, tow, and waste of flax, jute cuttings, and other substances, brought in for the use of the paper-maker.

An Exhibition of manufactures and arts has been held at Lahore, and with great succcess.

An Act for the prevention of the Adulteration of Cotton in the Bombay Presidency came into operation on the 1st of February.

The Exports from France during the month of January last exceeded those of the preceding January by upwards of 34,000,000f., of which a great part was supplied by the manufacturers of Paris and the neighbourhood. The diminution in the exports to the United States is more than compensated for by the increased demand from almost every other country. Great activity prevails throughout the ironworks, manufactories, and workshops of Paris.

Woollen Trade in France.—Since raw cotton has attained so high a price, and the import duty on wool has been reduced, but particularly since the commercial treaty with England and other countries has opened new markets for French industry, the woollen trade has greatly increased in France. In 1861 France exported only 188,000,003f.-worth of woollen cloths. The exportation rose to 221,500,000f. in 1862, and last year the woollen cloths exported amounted in value to 283,000,000f., being an increase of 61,500,000f. over the year 1862, and of 95,000,000f. over 1861. Of 241,000,000 kilogrammes of wool imported into France last year, England supplied 17,249,604 kilogrammes; Rio de la Plata, 8,289,690; Turkey, 8,331,671; Germany, 5,703,459; Belgium, 3,643,282; Spain, 1,727,705; Algeria, 5,143,476; the Coast of Barbary, 3,454,101 kilogrammes. The export of woollen fabrics continues to increase. It amounted in the month of January last to 22,300,000f., against 17,300,000f. in January, 1863.

The Trade and Navigation Accounts for January last show that during the month 2,924 vessels, with a tonnage of 725,975 tons, entered our ports, and 2,762, with a tonnage of 769,210, cleared outwards. The tonnage in the corresponding month of 1863 was, inwards, 689,084, and outwards, 694,274. There were exported 568,851 tons of coal, valued at £270,160; cotton yarn, 4,748,054lb, value £630,211; cotton manufactures to the value of £293,314. The imports of cotton were 81,639 cwts.; tea, 7,694,539lb.; sugar (unrefined), 553,145 cwts.

Colonies.

The Rust in the Wheat, at one time considered to be confined to the coast territory (in New South Wales), has made its appearance inward. The exact cause of the blight is still a mystery, but the upper lands are more free from it than the lower. It has been almost universal along the coast.

New South Wales.—The estimates of the probable expenditure have been lately laid upon the table of the Assembly. The amount required for the year 1864, to defray the expenses of the Schedules, the Executive and Legislative, and the other departments of the Government, is £1,584,957; for special appropriations, £341,500—total, £1,926,457. Under the head of loans, the sum required is, £451,127, £234,827 of which amount is to cover excess on votes taken in the years 1855 and 1857, 1858, and 1860, for the extension of the northern, southern, and western railways to Singleton, Picton, and Penrith. The balance to be raised by loans is for harbour and navigation, roads and bridges, public works, and electric telegraphs.

Sydney Free Trade and Direct Taxation League.—An association under the above title is in progress of formation in Sydney, by several intelligent mechanics. At an early date their principles of action will be laid before the public, and lectures upon free trade, as opposed to protection of native industry, will be delivered in Sydney, and ultimately in other parts of the colony.

Sydney.—Bar Iron.—A quantity of bar iron, the finest of the Fitzroy Iron Works, at Mittagong, has arrived in Sydney.

Industrial League in Sydney.—A meeting, called by the secretaries of the League for the Promotion of Colonial Industry, was held in December last, in the Masonic Hall, for the purpose of expressing approval of the proposed new tariff recently submitted to Parliament. There was a numerous assemblage.

Exploration in New Zealand.—A discovery has just been made in the middle island of New Zealand which is likely to be of considerable value in aiding the development of the resources of the Otago. Everything that tends to facilitate communication between the principal places of settlement must be regarded as a gain to the community, and though existing interests may suffer for a while by the diversion of traffic in the opening up of new routes, the result, in the long run, must prove beneficial. Dunedin, Invercargill, and Riverton have hitherto been the rival ports which sought to obtain the trade of the lake district, this being the most important part of the trade, inasmuch as it includes the gold brought down from the gold fields. If the discovery which Dr. Hector has made should be verified by subsequent researches, it will be found that the gate to these gold fields will be no longer by the ports just named, but that they may be reached with greater facility from the west coast. On some of the maps of the middle island the course of a river is traced from the lakes to the sea in the neighbourhood of Milford Haven. A native track is marked which had been, no doubt, used at some time or other by the few natives who still linger about the west coast, or by their forefathers. There is good reason to believe that this river and this track have been now traversed by Dr. Hector, but be this as it may, there is no doubt that the auriferous lands on the borders of Otago and Canterbury, and along the line of lakes that extend thence southwardly by west, can be readily approached from the west coast. If this be so it is more than probable that a rival port will spring up either in Milford Haven or Martin's Bay, at the mouth of the river, which the explorer has named Kadaku, or on the lake, to which he has given the appellation of Kakapo. Such a port would be within three or four days' steaming from Melbourne, and in a track less subject to violent winds than the course through Foveaux Straits. Some time since Dr. Hector sailed from Port Chalmers in a small coaster, accompanied by a little band of explorers, to examine the west coast. It has long been supposed that one or other of the little known and seldom visited inlets of that unpeopled coast, if not a river, at least a practicable track would be found to the gold fields of the lake district. On his return from his explorations on the northern border of the province, this gentleman was charged with the attempt to discover whether such a means of access did really exist. According to advices recently received his efforts have been crowned with unexpected success.

Wool Trade in New South Wales.—It is well-known that the high rate of freight renders it necessary to compress the bales into a much smaller space than is possible on a station. Formerly this was done by manual labour, the wool being stored in tents, and there being consequently delay and frequently injury. A leading firm at Sydney have recently erected stores capable of holding 5,000 bales, with five hydraulic presses, each working to a pressure of 200 tons, driven by a steam engine of about 10-horse power, and capable of turning out 500 bales a day in each store. The wool, after being pressed, is simply rolled and hoisted on board at once, by steam power, as in most instances the vessels go alongside the quay, but, should it be necessary, there are two lighters with steam lifting apparatus to take it out into the stream. These stores are each capable of pressing for six ships, and employ upwards of a hundred men.

Arrowroot in New South Wales.—A Sydney paper states that a very superior sample of arrowroot has been grown at Tomago on the Hunter. It appears that it has been manufactured in small quantities for the last four years. It was awarded the prize at the late Maitland Agricultural Show. This season between three and four hundred weight have been sold, some of which has been sent a considerable distance into the interior. Next season the growers expect to have a considerable quantity for the market, as they have now between eight and nine hundred plants. There seems to be every probability, from the improved machinery in use and other causes, that this article, which is at present largely imported, will, before long, become an export of the colony.

Co-operative Societies in Queensland.—Co-operative societies continue to prosper in this colony, and promise to become great social institutions there. One has lately been formed under the name of the Queensland Co-operative Cotton Growing and Manufacturing Company. It has been started under very favourable auspices, and already the company has purchased 640 acres of land. The Lancashire Co-operative Cotton Company have as yet faithfully carried out the promises made to the portion of the public that assisted them ;

they have already about seven acres of cotton in, which is now two or three inches above the ground and looks very healthy; they have six acres more prepared for planting. In order to supply the wants of their little colony, they have planted two or three acres with English potatoes, and one acre with the sweet potatoe. They will probably be able to get in twenty acres of cotton this spring.

Obituary.

Richard Roberts, of Denbighshire, the instinctive mechanician, better known as Roberts of Manchester, the informing spirit of the wide-famed firm of Sharp, Roberts, and Co., has passed away, and his mortal remains lie in the Cemetery at Kensal-green. How much this one man did for the material progress of England and the world, is known but to few, but, could the results suddenly disappear, all would be conscious how wide a gap would be left. The material profits of the world are represented by millions on millions of pounds sterling, accumulated and accumulating even while the blessing conferred on humanity, by substituting metallic drudges for living beings is overlooked. Inventive mechanicians in the highest sense are far from numerous—their faculty is as much a peculiar gift as that of the poet or musician, albeit in these latter days there be many who reckon invention to be a process as natural and inevitable as that of hens laying eggs. They mistake contrivance for invention, and would consider the scooper out of a cavern in a sandstone rock for purposes of shelter, to be on a par with the architect of the Parthenon or of York Minster. Richard Roberts possessed emphatically the gift of invention, not mere improving in a fixed track, but the power of imagination to convert matter generally to human uses, by changing its form and variously combining it; this faculty is the basis of all engineering in the higher sense, doing that which has not been done before, and also doing it well and usefully. Imitating what has been done before is the process of the builder and constructor, rather than that of the engineer. Richard Roberts began his career as pattern-maker to a millwright, in the days when engineers were unknown as a professional body. The word "pattern-maker," in its largest sense, is one of high import. It means the designer of a new form or type; in the technical meaning, it is one who copies accurately in wood or metal a design first presented in a drawing by the original designer. To do this work well requires precision of hand and eye, and in using hand and eye for others it was not long before Richard Roberts discovered that he had within him a well-spring of imagination fitting him to originate as well as execute. So he came to London, the metropolis of progress, and was one of those who helped in the workshops of Maudslay, also a self-educated man of his own kind. He was then, in the year 1814, twenty-five years of age. In the year 1817 he began to work for himself in Manchester, and turned his attention to the construction of machine tools. Skilled fingers, such as he himself possessed, were rare and costly, and no large amount of work could be executed by them. In mechanical engineering, plane surfaces, mathematically true, are an essential of success. These plane surfaces were produced by what was technically termed "chipping and filing," all executed by human hands. In dealing with a soft material such as wood, a joiner can produce plane surfaces with comparatively little labour, but in stubborn metal, skill of eye and hand needs also strength of muscle. So Richard Roberts devised a machine to form true planes on iron surfaces as freely as a joiner planes wood, and after that he made other machines to cut grooves, or square holes, or "mortices," in iron also, and to form true teeth on wheels and pinions. From that time forth he possessed metallic workers, needing neither eye nor hand, but only human attendants, to set them in operation. Metal henceforth became as pliant as wood had been before it, and iron began to supply the place of timber in machinery. In the year 1823, Richard Roberts had acquired a reputation that induced a capitalist, Thomas Sharp, to seek him and obtain him for a partner. There are qualities in most men which induce them to desire for themselves a monopoly of the things they are anxious to acquire, and at the same time to denounce all attempts at monopoly in others. About the year 1824 the dominant monopolists in Lancashire were the working spinners, who claimed, as they had a right to do, their own prices for labour, but they also claimed a right of excluding others from working. Upon this the mill-owners applied to Richard Roberts, the man of most mark in invention, to construct for them a self-acting mule, *i.e.*, a traversing frame, holding an enormous number of spindles for spinning thread, moving backwards and forwards by steam power, and only requiring the attention of a child or two to piece broken thread. When it was finished and at work, the mill owners wished to have it, and set it at work simply in terrorism, but Richard Roberts refused to be a mere tool to change the monopoly from men to masters. So it lay some time in abeyance, and meanwhile he devised a system of gauges and patterns to make all parts exactly alike, so that any part of one machine would fit any other machine. By the year 1830 the machine received many other improvements which perfected it, and millions on millions of spindles are now at work over the whole civilised world, each separate spindle doing more and better work than any five or six of the human beings—girls or women—known of erst as "Spinning Jennies." He then turned to locomotive engines, and some 1,500 have been constructed at their works during a term of thirty years. Then he turned to turret clocks, and devised the original system now largely employed by Dent. When the Conway bridge, with its millions of rivets, was about to be constructed, he devised a machine analogous to the Jacquard loom, for punching accurately the holes in the plates. This machine has since been used in the construction of the Boyne viaduct, the Victoria bridge at Montreal, and the Jumna bridge in India. In 1852 he turned his attention to steam ships, and, departing from all existing practice, he adopted two side keels instead of the usual central, and applied two screw propellors, one on each side, with separate engines, thus enabling vessels to turn round in their own length by setting the screws to work in opposite directions. This proposition, announced in 1852, has become an acknowledged practical fact only in 1864. And so passed away a long life of utility. As a matter of course, Richard Roberts patented his inventions. All Manchester would have wondered had he not done so, and nevertheless would have used his inventions without recognition if he had not protected them. It has become a wide-spread fashion at the present time to denounce patentees as monopolists, but on examination it will appear that the denouncers are simply would-be monopolists, capitalists who would put all competition out of the market but for the competition of new inventions. Doubtless the patentee inventor also aims at a monopoly, but it is in strong competition with the capitalist, whom he can only conquer by giving the public something better or cheaper. As a rule, the capitalist does not care what he makes or wastes so that he does it to his own profit. A Manchester manufacturer once remarked to an inventor, "You come at a wrong time. We never make improvements till profits get wiredrawn, and they are very good just now." Without protection for new manufactures or new ideas no manufacturer would make improvements, expending his money only to teach his neighbours new arts at his cost. It would be a fatal day to progress could capitalists succeed in making all ideas common property, and abolishing copyright in art, literature, and manufacturing invention. The glory would have departed from us. Inventors create capital, not often for themselves. They gain it, and, if true inventors, expend it again. They are make-alls, not save-alls. The Arkwright class of psuedo-inventors, the men of business, are the great accumulators, and of great value to the nation, but they are commercial men, not producers in the true sense. The true inventor is never satisfied with the imperfect present while he can obtain a glimpse of a more perfect future. The established capitalist, with his red tape and his patterns all ticketed and docketed, hates this disturbing force, which interferes with all his existing arrangements, perchance "hindered him of half a million"—when his mill, with all the latest improvements, was just completed, brought forth another mill which could work five per cent. cheaper, by some new crotchet springing from a mechanical brain. Richard Roberts was a true inventor. Of the millions of capital he created for the world, he reaped thousands and expended them, and passed out of life at three-score years and fifteen, leaving behind him, unprovided for, his only daughter, who nursed him through his declining years, and prolonged his life by her cares. His funeral was a public one, provided by his friends in Manchester as a mark of their respect, and was numerously attended by his brother engineers, by many of his old workmen and pupils, and by a large number of eminent men in all walks of life. Richard Roberts was elected a member of the Society of Arts in 1860.

Notes.

Diamagnetic Action of Water.—Professor Maas, of Namur, in a communication on this subject made to the Royal Academy of Sciences of Belgium, expresses his opinion that water is the determining cause of the diamagnetism of certain organised substances. He states that Faraday, in his work on magnetism, has ranged elder-pith and ivory among diamagnetic bodies. After having observed the diamagnetism of a small prism of elder, he was surprised to find it changed to para-magnetism a short time afterwards. In order to ascertain the cause, he cut from a long cylinder of oldish elder-pith two prisms, using a knife electrotyped with copper. One of these prisms was left exposed to the air, the other was inclosed in a flask containing some drops of distilled water. The first was found to be powerfully axial-magnetic, the other as powerfully equatorial. M. Maas hence concludes that the water made the latter diamagnetic. Several slices of ivory cut in different directions from an old piece equally surprised him, since none placed itself across the axis of the magnet; one placed itself axially; another made a very open angle with the same axis. A third example was a small cylinder composed of starch, gum arabic, and water. Freshly prepared it placed itself transversely, but when spontaneously dried it became para-magnetic. "Hence," says M. Maas, "we may be permitted to suppose that many natural organic substances owe their diamagnetic property to the interposition of liquids, of which water forms the larger proportion." The apparatus employed in the experiment was a Faraday's electro-magnet, modified by Becquerel, and constructed by Secretan.

Syro-Egyptian Society, March 8th, Samuel Sharpe, Esq., F.S.A., in the chair. J. T. Whitty, C.E., D.C.L., L.L.D., read a paper, being a brief statement of facts, enlarged upon in a work recently published upon "The Water-supply and Drainage of Jerusalem," a subject which is attracting a good deal of attention at the present moment, and to carry out which, by purely benevolent means, a society is in the act of being formed under high auspices.

Artificial Rainbow.—*Cosmos* states that Monsieur Duboscq has contrived for use in the French theatres a method of imitating the rainbow. He uses an electric light, obtained with the aid of 100 cells of Bunsen's battery. This rainbow is said to show brilliantly even when the whole stage is lighted up.

Ruins of Pompeii.—Thanks to the present government of Italy, these remains can now be visited and studied with much greater satisfaction than formerly. On entering the city a fee, fixed by the State, of two francs, is paid by each visitor. The guides, forbidden themselves to receive anything, are to be known by their uniform. All the villas are kept swept, so that the beautiful mosaic pavements can be seen to great advantage without the visitor being troubled by the insatiable demands of innumerable sweepers as formerly, who were stationed at every villa. Fresh excavations are continually though slowly going on, an annual government grant being made for that purpose.

Popular Lectures in Paris.—After several unsuccessful attempts, the English system of public lectures seems to have taken root in Paris. At an establishment in the Rue de la Paix there are discourses almost every evening in the week on various subjects, not political, by lecturers well known in the literary and scientific world, and a course is now in progress in another quarter of the city, the proceeds of which are to be devoted in aid of the unfortunate Poles. The most remarkable case is that of the opening of the theatre of the Sorbonne on two evenings a week for a like purpose; one of these is to be devoted to literature and the other to science, and, with the exception of a certain number of seats for ladies, for which tickets will be issued, these popular lectures in the hall of the University of Paris are offered gratis to the world. Excellent courses are given at the College of France, also public, but these lectures are delivered in the day time, when of course many persons are totally unable to attend. The Sorbonne has become, since the inauguration of the evening course there, a popular institution. On the evening of the first public lecture there were from a thousand to fifteen hundred persons at the doors more than the amphitheatre could contain; and the Minister of Public Instruction himself, under whose auspices this new movement has taken place, was, for some time, amongst the excluded. On the second evening better arrangements were made for ingress, but the size of the hheatre could not be increased, and, as on the former occasion, a vast number of persons were disappointed admission. The lecture, by M. Jamin, a very able manipulator, was on "The three Conditions of Matter"—solid, liquid, and gaseous, and the experiments were very well managed. On the third evening M. Lévêque lectured on "Poussin and French Art." The fourth evening was devoted to a discourse by M. Gratiolet, on "Man, and his position in Creation;" the next, to a lecture on "Voiture, and the Hôtel de Bambouillet;" and on the 21st inst., M. Wurtz will explain the "Phenomena of Combustion." The establishment in the Rue de la Paix has applied for permission to open a branch institution at the east end of the town, and it is said that applications have been made from several provincial towns for permission to establish similar courses of lectures. This is not the first, or even the second time, that the attempt has been made to popularise art, science, and literature in Paris, and it would be too much to say that success is now certain, but the experiment certainly promises well—at all events, for those courses to which the public are admitted gratis.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Medical, 8½. Dr. E. Symes Thompson, "Indigestion in early Phthisis."

Wed. ...Society of Arts, 8. Mr. B. H. Paul, "On Artificial Light and Materials used in Lighting."
Microscopical, 8.
Chemical, 8. Annual Meeting.

Thur. ...Society of Arts, 8. Cantor Lectures. Dr. F. Crace Calvert F.R.S., "Chemistry applied to the Arts—Use of Bones, &c.'
Artists and Amateurs, 8.

Fri.......Philological, 8.
Archæological Inst., 4.

PARLIAMENTARY REPORTS.

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SESSIONAL RPINTED PAPERS.

Par.
Numb.
19. Railway and Canal, &c., Bills (43. Bromley Railway; Buckfastleigh, Totnes, and South Devon Railways; 82. Hammersmith and Wimbledon Railway; 83. Hayling Railways; Helston and Penryn Railway; 84. Henley in Arden Railway; 85. Hereford, Hay, and Brecon Railway; 86. Holywell Railway; 87. Isle of Purbeck Railway; 88. Kent Coast Railway; 89. Kew, Turnham Green, and Hammersmith Railway; 90. Kingston, Tooting, and London Railway; Kington and Eardisley Railway; Knightsbridge Railway; 91. Knutsford and Warrington Railway; 92. Lancashire and Yorkshire Railway (Additional Powers), (Blackburn, &c., Lines); 93. Lancashire Union Railway; 94. Leeds, Bradford, and Halifax Junction Railway (Nos. 1 and 2); 95. Liverpool Central Station Railway; 96. Llanelly Railway and Dock (No. 1) (Capital), (No. 2) (New Line); 97. Llanidloes and Newtown Railway; 98. London and South Western Railway (Chertsey Extension); 99. London and South Western Railway (Kensington, &c.); 100. London and South Western Railway (North Devon Extension); 101. London, Brighton, and South Coast Railway (Kemp Town Stations and Lines), (Ouse Valley Line), (Tunbridge Wells and Eastbourne Line); 102. Macclesfield and Knutsfield Railway; Macclesfield, Bollington, and Marple Railway; 103. Maidstone and Ashford Railway; 104. Manchester, Sheffield, and Lincolnshire Railway; 105. Market Harborough and East Norton Railway; Market Harborough and Melton Mowbray Railway; Marple, New Mills, and Hayfield Junction Railway; 106. Midland Railway (Bath and Thornbury), (Chesterfield to Sheffield), (New Lines, &c.); 107. Mistley, Thorpe, and Walton Railway; Monkland Railways; 110. Newcastle under Lyme Canal and North Staffordshire Railway; Newquay and Cornwall Junction Railway; 111. Newry and Greenore Railway; 112. North and South Junction Railway; 113. North and South Western Junction Railway; 114. North British Railway (Abbey Holme and Leegate Branch), (Carlisle Citadel Station Branch), (Perth Branch); 115. North Durham Railway; 116. North Eastern, Lancashire and Yorkshire, and West Yorkshire Railway; 117. North Staffordshire Railway (New Works), (Silverdale, Madeley, and Drayton); 118. North Western Railway; Okehampton Railway; 119. Oswestry and Newtown and other Railways (Amalgamation, &c.); 120. Oswestry and Newtown, London and North Western, and other Railways)—Board of Trade Reports.
79. East India (Education)—Copy of Despatch.
20. Bill—Insolvent Debtors.

Delivered on 2nd March, 1864.

34. Naval Receipt and Expenditure—Account.
39. Mortgaged Benefices—Return.
86. Metropolitan Improvements (Advances out of the Consolidated Fund)—Statements.
19. Railway and Canal, &c. Bills (163. Wood Green and Enfield Railway; 164. Worcester, Dean Forest, and Monmouth Railway; 165. Wrexham, Mold, and Connah's Quay Railway; 166. Bangor and Llanberis Direct Railway; 167. Bodmin, Wadebridge, and Cornwall Junction Railway; 168. Cowes and Newport Railway; 169. Crieff and Methven Junction and Branch Railway; 170. Erith Tramways; 171. Flintshire Railway; 172. Grand Western Canal and Bristol and Exeter Railway; 173. Halifax and Ovenden Junction Railway)—Board of Trade Reports.
38. Bill—Bills of Exchange and Promissory Notes (Ireland).

Patents.

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From Commissioners of Patents Journal, March 18*th*.

GRANTS OF PROVISIONAL PROTECTION.

Artificial marble, manufacture of—485—H. A. Bonneville.
Artificial stone—490—F. Ransome.
Atmospheric engine—513—L. E. Mouline.
Balloons, &c.—591—R. A. Brooman.
Bricks, &c., preparation of clay for—579—A. V. Newton.
Buffers—512—J. Woodward.
Capillary filter, endless spouting—472—J. F. Rivier.
Casks, &c.—551—S. Bourne.
Centrifugal machines—528—F. P. Langenard.
Coal, &c., production of oil, &c., from—521—J. P. Raeburn.
Cotton, &c., machinery for opening, &c.—520—W. Noton.
Cradles, &c., inodorous apparatus applicable to—500—W. E. Gedge.
Cutters for facing up wood—533—E. H. Bentall.
Drilling machines—471—J. Buckton.
Dumb jockeys for breaking horses—599—S. Blackwell.
Dyeing—505—S. Cooper and J. M. Worrall.
Dyeing, &c., green colouring matters for—474—H. Carter.
Dyeing looped cut pile fabrics—583—J. M. Worrall.
Fabrics, braided or plaited—489—G. B. Braid and R. Furnival.
Fibrous materials, apparatus for ginning, &c.—587—C. Brakell.
Fibrous materials, preparing, &c.—478—E. Calvert and T. Edmeston.
Fibrous matters, dressing of—518—L. A. Laniel.
Files, manufacture of—565—C. Jordan.
Filtering apparatus—482—A. Prince.
Fire-arms, breech loading—492—E. C. Shepard.
Fire-arms, breech-loading—522—G. Davies.
Flour, apparatus for manufacturing—501—W. E. Gedge.
Fuel, compressed—479—J. Grantham.
Gloves—539—S. Pritchett.
Grain, machinery for drying, &c.—545—E. T. Hughes.
Green colouring matter—549—R. A. Brooman.
Hay-making machines—555—T. Grace.
Hides and skins, stretching and dressing—593—W. Clark.
Hoop skirts—475—W. E. Newton.
Iron, &c., forging, rolling, &c.—105—T. W. Plum.
Iron for ironing—484—E. Rolfe.
Linen, &c., mucilaginous matters for dressing—581—L. A. Laniel.
Locomotive and portable engines—439—E. E. Allen.
Locomotive engines—559—W. G. Beattie.
Locomotive engines, &c.—321—H. A. Fletcher.
Looped fabrics—483—J. Thornton and J. Higton.
Malt liquors, fermentation of—507—W. H. Mellor.
Manure from woollen rags, &c.—597—J. T. Way.
Memorandum book—499—C. Hibberd.
Metal sheathing, yellow—491—P. H. Muntz.
Money tills—527—G. Gaze.
Motive power, apparatus for obtaining—535—H. Bennison.
Ovens, construction of—553—F. Smith.
Percussion pouch—524—A. V. Newton.
Ploughs—477—J. H. Johnson.
Pontoons for building structures in water—575—J. Symes.
Railroad bars, &c., machinery for rolling—510—J. Robinson.
Railway breaks—457—A. and F. Izerable.
Railway carriages, &c., ascertaining the weight in—517—W. Bunger.
Shaking, riddling, &c., mechanism for—486—T. Bradford.
Silk waste, machinery for dressing—589—T. Greenwood and H. Hadley.
Slag, treatment of—476—G. Parry.
Spectral images, &c., on a stage—498—J. H. Pepper.
Steam boilers—509—T. Rickett.
Steam boilers, heating the feed water of—567—A. V. Newton.
Steam engines, rotary—502—W. Southam.
Steam generator—494—H. Barwell.
Textile materials, &c., roving, spinning, &c.—508—W. Cox.
Tin, &c., obtaining impressions on—571—W. E. Gedge.
Travelling bags, &c.—493—E. Bingham.
Tubes, rods, &c., manufacture of—541—G. P. Harding.
Twin screw propellers—514—E. Humphrys.
Velvets, &c., colouring the cotton or back of—496—J. P. Worrall.
Velvets, &c., manufacture of—511—W. E. Newton.
Velvets, &c., treatment of, previous to dyeing black—495—J. M. Worrall and S. Cooper.
Walking stick handles, &c., bending wood for—561—W. Dangerfield.
Walls, &c., sea and river embankment—527—B. P. Stockman and J. S. Scott.
Waste steam, heating water by means of—585—D. Brodie.
Water pressure engines—573—W. Clark.
Weaver's harness—515—E. T. Hughes.
Weights, break apparatus for raising, &c.—547—W. E. Newton.
Windlasses, &c.—557—L. Hill.
Wool, machinery for cleaning—523—E. F. Pastor, jun.

PATENTS SEALED.

2322. A. A. Downes.
2323. G. Alcan.
2337. J. Bond and J. Bond.
2338. R. A. Brooman.
2345. W. Gibb and J. Holland.
2346. W. T. Eley.
2347. A. Collingridge.
2351. W. Woofe.
2354. W. G. Helsby.
2409. P. Leslie.
2433. J. W. Guilmette.
2655. P. B. O'Neill.
2676. O. C. Evans.
2677. J. R. Johnson.
2699. S. H. Parkes.
3034. T. Harrison.
3060. S. Smith.
3093. T. Harrison.

From Commissioners of Patents Journal, March 22*nd*.

PATENTS SEALED.

2350. A. E. Ragon.
2357. J. Sturgeon.
2370. W. Clark.
2374. W. Malam and W. Tice.
2377. L. J. J. Jean.
2378. P. Bourchani.
2379. P. Cato.
2382. J. H. Johnson.
2392. P. and J. Llewellin and J. W. James.
2410. T. Horsley.
2455. C. P. Button,
2458. E. Slaughter.
2490. J. W. Goundry.
2520. W. J. Rideout.
2573. J. W. Nottingham.
2581. C. Schiele.
2731. J. A. Barral and L. A. Cochery.
2747. R. T. Tait.
3. J. W. Nottingham, W. H. Postlethwaite, & A. H. A. Durant.
159. H. Brockhurst and J. Sullivan.
204. H. A. Bonneville.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

642. J. A. Phillips.
652. F. Trachsel and T. Clayton.
705. M. J. F. Chappellier.
670. W. F. Henson.
664. J. Holden.
678. C. N. Kottula.
891. J. Lancelott.
687. B. West.
693. T. Brooks.
701. N. Lloyd and J. G. Dale.
710. W. Andrews.
795. R. Ridley and J. Rothery.
843. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

763. J., T., and G. Wilkes.
744. C. & J. Askew & H. Myers.
791. W. Moxon, J. Clayton, and S. Fearnley.
776. T. S. Adshead and J. Holden.
807. H. and E. T. Dolby.